



# Food Preservation

## Drying Fruits & Vegetables

### Lesson 8

**FNH-00562H**

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### **Drying**

Drying foods is one of the oldest methods of preservation known to man. It preserves food by removing moisture from food to a point where growth of microorganisms cannot be supported.

Drying is one of the simplest methods of preservation, requiring little outlay of special equipment and expense. It can be done out-of-doors or indoors in an oven or specially built dehydrator. Most foods can be successfully dried. The quality is not improved by drying and does not preserve nutrients, so it is important to begin with foods at the peak of their quality.

### **Procedure**

Moisture must be removed rapidly enough to prevent spoilage but slowly enough to allow migration of moisture from the inside of pieces of food to the outside. If drying is too rapid, a crust will form on the outside of the food, trapping moisture inside the food.

### **Foods**

Most foods can be successfully dried. Some foods dry better than others. Those that dry best include:

Apples	Chile Peppers
Apricots	Sweet Potatoes
Cherries	Sweet Corn
Peaches	Onions
Plums	Carrots
Nectarines	Beans, all kinds

Choose fruit that is fresh, sound and just right for eating. Vegetables should be fresh and in prime condition.

### **Sun Drying**

Many drying methods are satisfactory. In warmer climates, sun drying may be a good method. In climates where the daytime temperature reaches 100°F, the humidity is relatively low, and where the temperature remains hot at night, sun drying can be very successful. It may be necessary to move food inside at night to avoid condensation of dew on the partially dried foods.

Green vegetables are not usually satisfactorily dried in the sun. The ultraviolet light bleaches the chlorophyll so that the resulting products are a very pale green. Foods that are sun-dried should be moved to the shade as soon as they are no longer sticky. This helps prevent browning which results from direct light.

## Oven Drying

Oven drying can be used, but, it is difficult to maintain an oven at 140°–150°F. If the temperature is higher than this, a dried crust can form on the outside of the food preventing the inner moisture from escaping. Many flavoring compounds are very sensitive to heat and may be driven out of the food at higher oven temperatures. The oven is expensive to use for drying. Leaving the oven door open to control the temperature is hard on the thermostat. An electric fan outside the oven will speed the drying, but also uses more energy, both for the fan and because the oven will be turning on more often because of the air circulation.

Drying in microwave ovens is not recommended by most drying authorities. Microwave ovens are not adequately vented and, therefore, moist air does not escape, making drying difficult. Because of the rapid heating, microwave-dried products are not only dry, but also cooked. The margin of error for drying time in the microwave oven is very small, so that burning and scorching are not uncommon. In addition to the other reasons for not using the microwave oven for drying, it is expensive.

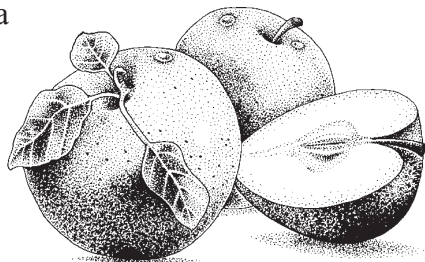
## Dehydrators

Dehydrators especially designed for drying food are available in many types. The natural draft dehydrator contains no fan. In order for it to do an adequate job, it must be twice as tall as it is wide. In order to have satisfactory drying in the natural draft dehydrator, the trays must be moved around frequently to avoid uneven drying.

Forced air dehydrators are popular and are quite effective. They contain a fan and a heat source such as light bulbs. The air movement capacity for the fan should not be more than 700 cubic feet per minute. Greater air flow

than this causes a crust to form on the outside of the food so that moisture cannot escape easily.

The thermostat on such a dryer should be accurate to within ten degrees of the set temperature. The cost to operate a dehydrator ranges from  $\frac{3}{4}$  to two cents per hour, the average is approximately  $1\frac{1}{2}$  cents per hour.



## Preparations For Drying

### *Vegetables*

Most vegetables must be blanched prior to drying since the same enzymes that produce an off-flavor in frozen vegetables will do the same in dried. The enzymes can be active even at a moisture content too low for microorganisms to grow.

Those vegetables which need no blanching are okra, onions, parsley, peppers, pimentos, mushrooms and horseradish. Herbs need no pretreatment before drying.

### *Fruits*

Most fruits require some sort of pretreatment to prevent browning and loss of Vitamin C. Those which need no treatment are figs, grapes, persimmons, and prunes. The most effective pretreatment is sulfuring, however, it is a rather complicated procedure and one most people probably won't use unless they dry large amounts of fruit. Use of a bisulfite or ascorbic acid solution will reduce the browning and, of course, blanching will destroy the enzymes responsible for browning.

## The Drying Process

Directions for proper drying are found in Extension publications. Times will be approxi-

mate because of differences in temperatures, air flow and size of pieces of food. This makes it necessary to judge dryness subjectively. Food must be cooled before being tested for dryness. Different foods will have different criteria for dryness.

Foods that are dried in the sun may have become contaminated from the air or insects. It is a good idea to pasteurize these products before packaging. Pasteurization may be accomplished by placing the foods in an oven at 175°F for 10–15 minutes. This heats the surface, where the contamination is likely to be, without cooking the food. Instead of heating, the microbial population can be reduced (not eliminated) by freezing for two hours.

For those who have difficulty deciding whether or not a food is dry a procedure has been developed for testing dryness. The food should be placed in an airtight container and allowed to sit for some time (two days to two weeks, depending upon size of piece). The food should be stirred once or twice per day. If the food appears to become more moist, more drying is probably needed. This process allows a redistribution of the moisture in case the food has dried unevenly. After it has had a chance to become distributed evenly it is possible that more moisture should be removed.

## Packaging

Food will keep top quality only if properly packaged. The packaging material must provide a barrier between the food and the air. The food can pick up enough moisture from the air to support the growth of microorganisms. The food will also maintain best quality if not exposed to light or metal. An opaque material would shield out the light, or if a clear plastic wrap used, store in a dark place. Coffee cans with plastic lids are satisfactory only if the food does not come in contact with

the metal of the can. If dried food is stored in glass jars with metal lids, two layers of plastic wrap should be placed between the lid and the jar.

## Keeping Quality

Most dried foods will maintain satisfactory quality for one year. The stronger flavored vegetables, such as onions and cabbage maintain top quality for only six months.

## Use Of Dried Foods

Dried fruit or meat may be eaten as is or rehydrated for eating. Dried vegetables are generally added to such things as soups or stews and not used alone as a side dish. Rehydration generally takes 1½–2 hours in enough water to cover the food. Once the food is rehydrated it is perishable and must be treated accordingly.

## References

*USDA Complete Guide to Home Canning.* Online version: [www.uga.edu/nchfp/publications/publications\\_usda.html](http://www.uga.edu/nchfp/publications/publications_usda.html). Print version (\$18): <https://mdc.itap.purdue.edu/item.asp?itemID=19265&ListType=&subcatID=68&catID=26>.

*So Easy to Preserve.* \$18. University of Georgia Cooperative Extension Service: [www.uga.edu/setp](http://www.uga.edu/setp).

*Ball Blue Book.* Ball Corporation, Consumer Products Division, Consumer Affairs, 345 S. High, Muncie, IN 47305-2326.

*Fruit Leather*, FNH-00228. Free. University of Alaska Fairbanks Cooperative Extension Service: 1-877-520-5211 or [www.uaf.edu/ces](http://www.uaf.edu/ces).

## Table For Drying Fruits and Vegetables

<b>Food</b>	<b>Preparation</b>	<b>Treatment</b>	<b>Dryness Test</b>
<b>Fruit</b>			
Apples	Peel, core, slice ½ inch thick	Anti darkening solution for 10 minutes	Pliable, springy, creamy white
Apricots	Peel, cut in half	Anti darkening solution for 10 minutes	Leathery
Peaches	Slice ½ inch thick	Anti darkening solution for 10 minutes	Glovelike
Berries	Leave whole	None	No visible moisture
Cherries	Remove stems and pits, leave whole	None	Leathery, sticky
Grapes	Remove from stems, leave whole	Scald 15–30 seconds to crack skins, cool and drain	Leathery, pliable
Pears	Peel, core, slice	Anti darkening solution	Leathery, springy
Plums	Cut in half, remove pits	Scald 30 seconds, cool and drain	Pliable and leathery
<b>Vegetables</b>			
Green beans	Cut 1-inch pieces	Scald 3 minutes	Brittle, dark green or brownish
Beets	Cook and skin, slice or dice	None	Dark, red, brittle
Cabbage	Shredded	Steam 2 minutes	Crisp, pale yellow to green
Carrots	Peel and slice	Scald 2 minutes	Tough and leathery
Corn	Cut off cob	Steam 10–15 minutes on cob	Dry, brittle, translucent
Mushrooms	Peel and slice	None	Very dry and leathery
Onions	Peel, slice thin	None	Very crisp
Peas	Shell	Scald 2 minutes	Brittle
Peppers	Remove seeds, slice or dice	Scald 1–2 minutes	Tough, leathery
Summer squash	Slice    inch thick	Scald 3 minutes	Leathery to brittle

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